What is Claimed is:

Sub A1

1. A physiological condition measuring device comprising:

a sensor (11) that includes:

light generating means (69, 421, 423) for providing light along a plurality of optical measurement paths, and

light detecting means (71, 425, 427) for detecting light along each of said plurality of optical measurement paths;

a processing system (141, 445, 452) that controls said light generated by said light generating means, measures light incident upon said light detecting means, and produces a measurement indicative of said physiological condition based on said measured light.

2. A measuring device according to claim 1, wherein said measurement comprises one of a measurement common to both optical measurement paths but distributed independently in each optical path and a different measurement associated with each optical measurement path

3. A measuring device according to claim 1, wherein said light generating means produces at least two wavelengths of light along each of said plurality of optical measurement paths.

4. A measuring device according to claim 3, wherein said processing system produces said measurement according to selectively weighted ratios of said light measured from said at least two wavelengths along each of said plurality of optical measurement paths.

5. A measuring device according to claim 3, wherein said processing system produces said measurement according to selective weighting of one of said two wavelengths along each of said plurality of optical measurement paths.

6. A measuring device according to claim 1, wherein said light generating means and said light detecting means are located on a single probe.

7. A measuring device according to claim 6, wherein said probe comprises a spiral hollow needle (65) suitable for screwing into tissue, comprising a plurality of window areas suitable for light emission and light detection.

8. A measuring device according to claim 1, wherein at least one of said light generating means and said light detecting means comprise a light transmitting fiber.

9. A physiological condition measuring device comprising:

a sensor (11) that includes:

light generating means (69, 121) for generating light in at least three wavelengths to provide at least two sets of wavelengths of light, each set containing at least two wavelengths of light, and

light detecting means (71, 125) for detecting light at each of said wavelengths;

a processing system (141, 145, 149) that control said light generated by said light generating means, measures light incident upon said light detecting means, and produces a measurement corresponding to a weighted combination of said wavelengths.

10. A measuring device according to claim 9, wherein said processing system produces said measurement according to selectively weighted ratios of said light measured from said two sets of wavelengths of light.

11. A method of measuring a physiological condition comprising:

generating light along a plurality of optical measurement paths;

transmitting said light along each of said plurality of optical measurement paths through tissue,

receiving light transmitted along each of said plurality of optical measurement paths after having passed through said tissue;

measuring light received in said receiving step; and

producing a measurement indicative of said physiological condition based on said light measured in said measuring step.

12. A method according to claim 11, wherein said measurement comprises performing one of the following steps:

1) obtaining a measurement common to both optical measurement paths but distributed independently in each optical measurement path, and

2) obtaining a different measurement associated with each optical measurement path.

13. A method according to claim 11, wherein said light generating and transmitting steps include producing at least two sets of wavelengths of light along each of said optical measurement paths, and wherein said producing step includes produces said measurement according to selectively weighted ratios of said light measured from said sets of wavelengths along both of said optical measurement paths.

14. A method of measuring a physiological condition comprising:

generating light in at least three wavelengths to provide at least two sets of wavelengths of light, each set containing at least two wavelengths of light;

transmitting said light through tissue;

detecting light at each of said wavelengths;

measuring light detected in said detecting step; and

producing a measurement indicative of said physiological condition based on a weighted combination of said sets of wavelengths of light measured during said measuring step.

15. A physiological condition measuring device comprising:

an insertion rod (7) having a distal end and a proximal end, with a receiving cavity (33) being defined in said proximal end;

a sensor (11) selectively attached to said distal end of said insertion rod;

a circuit connector (9) having a distal end coupled to said sensor and a free proximal end, said free proximal end of said circuit connector and said receiving cavity of said insertion rod being sized and configured such that the said free proximal end of said circuit connector is selectively insertable into said receiving cavity and maintained in an engaged relationship therewith responsive to being fully inserted into said receiving cavity; and

an introducer tube (5) selectively positioned relative to said insertion rod so as to house at least a portion of said insertion rod therein with said circuit connector extending along at least a portion of a length of said insertion rod between said insertion rod and said introducer tube, said introducer tube being moveable in an axial direction relative to said insertion rod.

16. A physiological condition measuring device comprising:

an insertion rod (7);

a sensor (11) selectively attached to a distal end of said insertion rod;

a circuit connector (9) having a distal end coupled to said sensor and a proximal end that selectively couples said sensor to an external circuit;

an introducer tube (5) selectively positioned relative to said insertion rod so as to house at least a portion of said insertion rod therein with said circuit connector extending along at least a portion of a length of said insertion rod between said insertion rod and said introducer tube, said introducer tube being moveable in an axial direction relative to said insertion rod; and

a mechanism (13) that selectively couples said insertion rod and said introducer tube to maintain said introducer tube in a first position relative to said insertion rod wherein said sensor is located entirely within said introducer tube and that permits said introducer tube to be moved to a second position relative to said insertion rod wherein at least a portion of said sensor is located outside said introducer tube.

17. A physiological condition measuring device according to claim 16, wherein said mechanism is a deflectable tab disposed on said insertion rod, said tab being deflectable from a non-deflected position to a deflected position, in said deflected portion, said first tab provides a configuration that permits a first portion

of said first tab to insert between a portion of said introducer tube and said insertion rod, with said first tab being biased into an engaged relation with said introducer tube to maintain said introducer tube in said first position, and wherein removing said tab from within said introducer tube causes said tab to move to its non-deflected position out of a path of movement of said introducer tube relative to said insertion rod to permit said introduce tube to be moved to said second position.

18. A measuring device according to claim 17, further comprising a first tab (39) provided on a side of said insertion rod opposite a side on which said deflectable tab is located, said first tab being sized and configured to provide a force on said introducer tube opposite a force provided thereon by said deflectable tab responsive to said deflectable tab being biased into said engaged relation with said introducer tube.

19. A physiological condition measuring device comprising:

an insertion rod (7);

a sensor (11) selectively attached to a distal end of said insertion rod;

a circuit connector (9) having a distal end coupled to said sensor and a proximal end that selectively couples said sensor to an external circuit;

an introducer tube (5) selectively positioned relative to said insertion rod so as to house at least a portion of said insertion rod therein with said circuit connector extending along at least a portion of a length of said insertion rod between said insertion rod and said introducer tube, said introducer tube being moveable in an axial direction relative to said insertion rod; and

a tab (39) disposed on said insertion rod and extending between said insertion rod and said introducer tube, said tab being sized and configured so as to contact a portion of said circuit connector responsive to said insertion rod being rotated relative to said introducer tube to urge said circuit connector to rotate in a same direction of rotation as said insertion rod.

20. A physiological condition measuring device comprising:

an insertion rod (7);

a sensor (11) selectively attached to a distal end of said insertion rod, said sensor and an associated portion of said insertion rod being sized and configured such that said sensor rotates relative to said insertion rod if a torque applied on said sensor by said insertion rod exceeds a first predetermined amount and said sensor disconnects from said distal end of said insertion rod if a pull-off force exerted on said sensor by said insertion rod exceeds a second predetermined amount, wherein said first predetermined amount of torque necessary to cause rotation is independent of said second predetermined amount of force necessary to cause said sensor to disconnect from said insertion rod;

a circuit connector (9) having a distal end coupled to said sensor and a proximal end that selectively couples said sensor to an external circuit;

an introducer tube (5) selectively positioned relative to said insertion rod so as to house at least a portion of said insertion rod therein with said circuit connector extending along at least a portion of a length of said insertion rod between said insertion rod and said introducer tube, said introducer tube being moveable in an axial direction relative to said insertion rod.

21. A physiological condition measuring device according to claim 20, further comprising:

an applicator (21) provide at said distal end of said insertion rod to selectively attach said sensor to said insertion rod, wherein said applicator includes a plurality of walls (41) defining an opening (43), each wall being attached at its base to a remainder of said applicator and being separated from adjacent walls by a slot (45) so that each wall is adapted to flex in a direction generally perpendicular to its base to permit rotation of said sensor within said opening if said torque applied on said sensor by said insertion rod via said applicator exceeds said first predetermined amount, and

wherein said sensor includes a cup (67) and a needle (65) mounted in said cup, said cup having a base portion adapted to fit within said opening defined by said plurality of wall, wherein said base portion includes at least one protrusion (77) on a surface thereof, and wherein an interior surface of at least one of said walls includes a groove (47), said protrusion and said groove being sized and configured

such that said grooves selectively receives said protrusion responsive to said base portion of said cup being disposed in said opening of said applicator.

22. A physiological condition measuring device according to claim 20, wherein said sensor includes a cup (67) and a needle (65) mounted in said cup, said cup having a slit (81) defined at a side there, said slit providing a passageway from an interior cavity of said cup to an external portion of said cup, said passageway being defined by four walls and being sized to receive said distal end of said circuit connector.

23. A physiological condition measuring device comprising:

an insertion rod (7);

a sensor (11) selectively attached to a distal end of said insertion rod;

a circuit connector (9) having a distal end coupled to said sensor and a proximal end that selectively couples said sensor to an external circuit, said circuit connector including at least one conductor to carry signals between said distal and said proximal ends, and wherein said circuit connector includes at least one of the following;

(a) a stiffening member (130) provided at said proximal end of said circuit connector to minimize bending thereof,

(b) a shielding layer disposed on at least one side of said at least one conductor, and

(c) at least one slit extending at least partially into said circuit connector in a longitudinal direction thereof to increase a flexibility of said circuit connector; and

an introducer tube (5) selectively positioned relative to said insertion rod so as to house at least a portion of said insertion rod therein with said circuit connector extending along at least a portion of a length of said insertion rod between said insertion rod and said introducer tube, said introducer tube being moveable in an axial direction relative to said insertion rod.

24. A physiological condition measuring device according to claim 23, wherein said circuit connector includes at least two conductors to carry signals

between said distal and said proximal ends, and further comprising a control unit that transmits signals on said conductors as a differential pair.

25. A physiological condition measuring device comprising:

an insertion rod (7);

a sensor (11) selectively attached to a distal end of said insertion rod;

a circuit connector (9) having a distal end coupled to said sensor and a proximal end that selectively couples said sensor to an external circuit;

an introducer tube (5) selectively positioned relative to said insertion rod so as to house at least a portion of said insertion rod therein with said circuit connector extending along at least a portion of a length of said insertion rod between said insertion rod and said introducer tube, said introducer tube being moveable in an axial direction relative to said insertion rod; and

an interface that selectively couples to said proximal end of said circuit connector, said interface including an identification element, said circuit connector being configured such that connecting said circuit connector to said interface operatively couples said identification element to an external circuit that enables said external circuit to detect said identification element.

26. A method of forming a needle for use in a physiological condition measuring devices, comprising the steps of:

bending a hollow tube into a "J" shape;

beveling a first end of said tube proximate to said bend in at least three planes to define a point of said needle;

bending said tube from said "J" shape to a "P" shape;

defining at least one opening in said tube at a location generally facing a center of a circular portion of said "P" shape;

threading an optical element into said second end of said tube until a portion of said optical element is located in said window;

securing said optical element in place within said tube; and

bending said tube, including said optical element, into a spiral configuration.